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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,704	12/06/2001	Sang-Ho Ahn	9903-045	8392

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EXAMINER
TRAN, TAN N

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 03/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/008,704	AHN ET AL.	
	Examiner	Art Unit	
	TAN N TRAN	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *amendment filed on 01/22/03* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 20-115* is/are pending in the application.

4a) Of the above claim(s) *30-49* is/are withdrawn from consideration.

5)☒ Claim(s) *20-29,50-53 and 87-115* is/are allowed.

6)☒ Claim(s) *1-3,5-10,12-16 and 55-86* is/are rejected.

7)☒ Claim(s) *4,11,54 and 81* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8 and 9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 55-70,72 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not disclose the inner leads having a constant second thickness as recited in claim 55.

The specification does not disclose the inner leads are formed of a single layer as recited in claims 56,72.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3,55,71,57,73,5,59,75,62-64,78-80,8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Casto et al. (5,014,113).

With regard to claims 1,55,71, Casto et al. discloses a lead frame comprising a die pad 40, a plurality of leads (18,28) disposed around the die pad 40 and a tie bars 46 connected to and disposed around the die pad 40, wherein the die pad 40 comprises a chip attaching part and a peripheral part surrounding the chip attaching part; a semiconductor chip 12 mounted to the die pad chip attaching part, the chip 12 having a plurality of electrode pads 14, wherein the plurality of electrode pads 14 are electrically interconnected to the leads (18,28), and wherein each of leads (18,28) comprises integrally connected inner leads and outer leads; an encapsulant encapsulating the semiconductor chip 12 to form a package body 36, wherein the inner leads are encapsulated by the encapsulant and the outer leads are external to the encapsulant; and the chip attaching part having a first thickness and the inner leads (portion of leads 18 and 28) having a constant second thickness greater than the first thickness wherein the chip attaching part and the peripheral part have the same thickness and bonding wires 34 are connected to the portion of the inner leads (18,28). (Note figs.1, 2 of Casto et al.).

With regard to claims 2,57,73, Casto et al. discloses the first thickness is between about 30 percent to 50 percent of the second thickness. (Note lines 20-24, column 5, figs.1,2 of Casto et al.).

With regard to claim 3, Casto et al. discloses the chip attaching part and the peripheral part have the same thickness. (Note fig.1 of Casto et al.).

With regard to claims 5,59,75, Casto et al. discloses the die pad 40 is located below the leads 28. (Note fig.1 of Casto et al.).

With regard to claims 8,62,78 Casto et al. discloses upper and lower portions of the package body with reference to the leads (18,28) have different thickness each other. (Note fig.1 of Casto et al.).

With regard to claims 9,63,79 Casto et al. discloses the tie bar 46 has the same thickness as the leads 18. (Note figs.1,2 of Casto et al.).

With regard to claims 10,64,80 Casto et al. discloses the tie bar 46 has the same thickness as the die pad peripheral part. (Note figs.1,2 of Casto et al.).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6,7,16,60,61,76,77,70,86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Casto et al. (5,014,113).

With regard to claims 6,60,76 Casto et al. discloses the plurality of electrode pads 14 are electrically interconnected to the leads (18,28) via bonding wires 34.

Casto et al. does not disclose bonding wires are connected by balls formed on the surface of the leads and stiches formed on the electrode pads. However, it would have been obvious to one of ordinary skill in the art to form bonding wires are connected by balls formed on the surface of

the leads and stiches formed on the electrode pads in order to secure the interface between semiconductor chips and the die pads.

With regard to claims 7,61,77 Casto et al. discloses metal bumps are formed on the electrode pads 14 of the chip 12. (Note lines 1-7, column 4, fig. 1 of Casto et al.).

Casto et al. does not disclose the stiches are formed on the metal bumps. However, it would have been obvious to one of ordinary skill in the art to form the stiches are formed on the metal bumps in order to secure the interface between semiconductor chips and the die pads. (Note lines 1-7, column 4, fig. 1 of Casto et al.).

With regard to claims 16,70,86, Casto et al. does not disclose the semiconductor chip is a memory device and wherein the adhesive is a film made of an epoxy resin. However, it would have been obvious to one of ordinary skill in the art to form the semiconductor chip is a memory device and wherein the adhesive is a film made of an epoxy resin in order to secure the semiconductor chip on the die pad of the lead frame and because such structure is conventional in the art for forming a compact multi-chip package.

Claims 12-14,66-68,82-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Casto et al. (5,014,113) in view of Huang (2002/0113305).

With regard to claims 12,66,82, Casto et al. does not disclose the die pad comprises divided first and second die pads.

However, Huang discloses the die pad comprises divided first and second die pads (410,440). (Note fig. 1 of Huang).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Casto et al.'s device having the die pad comprises divided first and second die pads such as taught by Huang in order to secure semiconductor dies to be separated from the die pads of the leadframe.

With regard to claims 13,67,83 Huang discloses the first and second die pads (410,440) each include a chip attaching part and a peripheral part. (Note fig. 1 of Huang).

With regard to claims 14,68,84, Casto et al. does not disclose an adhesive bonds the semiconductor chip to the die pad chip attaching part.

However, Huang discloses an adhesive 11a bonds the semiconductor chip to the die pad chip attaching part. (Note fig. 6 of Huang).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Casto et al.'s device having an adhesive bonds the semiconductor chip to the die pad chip attaching part such as taught by Huang in order to secure the interface between semiconductor chips and the die pads.

Claims 15,69,85, are rejected under 35 U.S.C. 103(a) as being unpatentable over Casto et al. (5,014,113) in view of Kozono (6,177,718).

With regard to claims 15,69,85, Casto et al. does not disclose the lead frame is made of iron-nickel alloy or copper alloy, and wherein the bonding wires are gold wires.

However, Kozono discloses the lead frame 13 is made of iron-nickel alloy or copper alloy, and wherein the bonding wires 14 are gold wires. (Note lines 16-20, column 6, fig. 21 of Kozono).

Therefore, it would have been obvious to one of ordinary skill in the art to form the Casto et al.'s device having the lead frame is made of iron-nickel alloy or copper alloy, and wherein the bonding wires are gold wires such as taught by Kozono in order to prevent the lead frame from broken.

Allowable Subject Matter

4. Claims 4,11,54,58,65,74,81 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 4,11,54,58,65,74,81 are allowable over the prior art of record, because none of these references disclose or can be combined to yield the claimed invention such as another semiconductor chip attached to a back side of the chip attaching part as recited in claim 4,58,74, and the peripheral part protrudes in both directions from the chip attaching part, and the thickness of the peripheral part is equal to the thickness of the leads as recited in claims 11,65,81.

4. Claims 20-29,50-53,87-115 are allowable over the prior art of record, because none of these references disclose or can be combined to yield the claimed invention such as the peripheral part protrudes toward the second semiconductor chip as recited in claim 20, and the bonding wires connected to one of the semiconductor chips are shorter than the bonding wires connected to the other semiconductor chip as recited in claim 22,87; and a semiconductor package device having a package body of less than 0.7 mm of thickness as recited in claim 50.

Response to Arguments

5. Applicant's arguments filed 1/22/03 have been fully considered but they are not persuasive.

It is argued, at page 15 of the remarks, that "nowhere does Casto reveal a thickness of the die bond flag 40 that is less than the thickness of the first frame layer 18". However, lines 20-24, column 5, figs. 1,2 of Casto does show the chip attaching part having a first thickness and the inner leads (portion of leads 18 and 28) having a second thickness greater than the first thickness.

It is argued, at page 15 of the remark, that "claim 2 recites further details of the relationship between the chip attaching part and the lead thicknesses not disclosed by Casto". However, lines 20-24, column 5, figs.1,2 of Casto et al. does show the second frame layer 28 may also be designed to be appreciably thicker than the first frame layer 18, so the overall thickness of leads (18,28) is thicker than that of the chip attaching part 40.

It is argued, at page 16 of the remark, that "Casto, however, fails to teach or disclose any down-set between the die bond flag 40 and the horizontal top surface of the first frame layer 18". However, fig.1 of Casto et al. does show the die pad 40 is located below the leads 28.

It is argued, at page 17 of the remark, that "As previously noted, neither Casto nor Huang disclose a chip attaching part having a thickness less than a thickness of inner leads. Kozono also fails to teach this limitation". However, fig.1 of Casto et al. does show a chip attaching part having a thickness less than a thickness of inner leads (portion of leads 18 and 28).

It is argued, at page 18 of the remark, that "in dependent claim 55 requires that the thickness of the chip attaching part be less than the constant thickness of the inner leads. This limitation is absent in the prior art or record". However, fig.1 of Casto et al. does show the

thickness of the chip attaching part be less than the constant thickness of the inner leads (portion of leads 18 and 28). Thus, Applicant's claims 1, 2,5,15,16,55 do not distinguish over Casto, Huang, and Kozono references.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tan Tran whose telephone number is (703) 305-3362. The examiner can normally be reached on M-F 8:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for after final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TT

Feb 2003

Minh Loan Tran
Primary Examiner